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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/626,117	07/23/2003	Michele J. Berry	884.548US2	9523
21186	7590	06/16/2005	EXAMINER	
SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A. P.O. BOX 2938 MINNEAPOLIS, MN 55402-0938			THOMAS, TONIAE M	
			ART UNIT	PAPER NUMBER
			2822	

DATE MAILED: 06/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

H.A

Office Action Summary**Application No.**

10/626,117

Applicant(s)

BERRY, MICHELE J.

Examiner

Toniae M. Thomas

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 March 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 14-43 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 14-30 is/are allowed.
- 6) ☒ Claim(s) 31,34,35,37,38 and 41 is/are rejected.
- 7) ☒ Claim(s) 32,33,36,39,40,42 and 43 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This Office action is an official response to the request for reconsideration filed on 25 March 2005.

Allowability Withdrawn

2. The indicated allowability of claim 38 is withdrawn in view of the newly discovered reference to Wang et al. (US 6,610,559 B2). Rejections based on the newly cited reference follow.

Response to Arguments

3. Applicant's arguments, filed 25 March 2005, with respect to the following rejections have been fully considered and are persuasive: the rejection of claims 14-15, 18, 20, 23, 26, 31, 34-37, and 41-42 under 35 USC §103(a) as being unpatentable over Master (US 6,229,207 B1) in view of Bross et al. (US 5,303,862). Therefore, the rejection has been withdrawn. Accordingly, the rejections of claims 16, 17, 21, 22, 24, 25, 27, 28, 32, 33, 39, and 40 under 35 USC §103(a) have also been withdrawn. However, upon further consideration, new grounds of rejection are made in view of Bronson et al. (US 5,288,944) and Master (US 6,229,207 B1).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 31, 34, and 35 are rejected under 35 U.S.C. 102(b) as being anticipated by Bronson et al. (US 5,288,944).

The Bronson et al. patent (Bronson) discloses a substrate 120 for use in a microelectronic circuit package (*fig. 2 and col. 7, line 47 - col. 9, line 22*). The substrate comprises the following elements, **as recited in claim 31**: a plurality of pin contact pads 140 on a first surface 130 of the substrate (*fig. 2 and col. 7, lines 51-53*); a plurality of pins 170 soldered to the pin contact pads on the first surface of the substrate (*fig. 2 and col. 8, lines 11-14*); and a cured polymer material 200 about solder joints associated with the pins (*fig. 2; col. 8, lines 32-38; col. 8, lines 43-47; col. 9, lines 11-22*).^{1,2}

A microelectronic die 150 is attached to the substrate 120, **as recited in claim 34** (*fig. 2 and col. 8, lines 4-7*).

A layer of the cured polymer material 200 enshrouds a plurality of solder joints associated with the pins 170, **as recited in claim 35** (*fig. 2*).³

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject

¹ See also col. 6, lines 7-18.

² Epoxy resins are polymers.

³ The solder joint is interpreted as the solder connection 190 between a contact pad 140 and a pin 170.

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matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 37 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Master (US 6,229,207 B1) in view of Bronson et al. (US 5,288,944).

Master discloses a microelectronic device (fig. 3 and accompanying text). The device comprises the following elements, **as recited in claim 37**: a package substrate 42 having pin contact pads 52 on a first surface 46 thereof (*fig. 3 and col. 5, lines 46-63*); a plurality of pins 54 soldered to the pin contact pads on the first surface of the package substrate (*fig. 3 and col. 5, lines 46-63*); and a microelectronic die 40 connected to the package substrate (*fig. 3 and col. 5, lines 46-63*), the microelectronic die having bond pads 48 that are conductively coupled to the pins through the package substrate (*fig. 3 and col. 5, lines 46-63*).

Master lacks anticipation of a cured polymer material about solder joints associated with the pins. Bronson, on the other hand, does disclose a cured polymer material about solder joints associated with a plurality of pins. As discussed above with respect to claim 31, Bronson discloses a substrate for use in a microelectronic circuit package 120. The package substrate comprises: pin contact pads 140 on a first surface 130 of the substrate (*fig. 2 and col. 7, lines 51-53*); a plurality of pins 170 soldered to the pin contact pads

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on the first surface of the package substrate (*fig. 2 and col. 8, lines 11-14*); and a cured polymer material 200 about solder joints associated with the pins (*fig. 2; col. 8, lines 32-38; col. 8, lines 43-47; col. 9, lines 11-22*). A layer of the cured polymer material 200 enshrouds a plurality of solder joints associated with the pins, **as recited in claim 41** (*fig. 2*). A solder joint is formed by the solder connection 56 between each pad 52 and a corresponding pin 54. The cured polymer material 200 is used to prevent the failure of the solder connections 56 during a standard thermal fatigue test (*Bronson - col. 8, lines 32-38*). This would suggest to the skilled artisan that the cured polymer material is able to prevent the failure of the solder connections during high temperature processes. The failure of the solder connections would inherently result in movement of the pins.

Thus, it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to modify Master by providing a cured polymer material about solder joints associated with the plurality of pins 170, as taught by Bronson, because the cured polymer material is able to prevent the failure of the solder connections 190 during subsequent high temperature processes (e.g. an underfilling process) and, thereby, prevents movement of the pins 170.

6. Claim 38 is rejected under 35 U.S.C. 103(a) as being unpatentable over Master in view of Bronson as applied to claim 37 above, and further in view of Wang et al. (US 6,610,559 B2).

Master lacks anticipation of an underfill material between the microelectronic die and the package substrate, **as recited in claim 38**. The Wang et al. patent (Wang), on the other hand, discloses an underfill material between a microelectronic die 401 and a substrate 407 (*fig. 4 and accompanying text*). Wang discloses a microelectronic device, wherein the device comprises: a microelectronic die 401 connected to a package substrate 407 (*fig. 4 and col. 8, lines 14-20*); and an underfill material 411 between the die and the substrate (*fig. 4 and col. 8, lines 21-39*).

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to modify the combination of Master and Bronson, by providing an underfill material between the die 40 and the package substrate 42 of Master, as taught by Wang, because the underfill is able to provide mechanical, electrical, and environmental protection for the microelectronic device (*Wang - col. 8, lines 35-38*).

Allowable Subject Matter

7. Claims 14-30 are allowable over the prior art of record. The prior art of record does not anticipate, teach or suggest a substrate for use in a microelectronic circuit package substantially as claimed, wherein the package

comprises a separate portion of encapsulation material surrounding a solder joint associated with each of a plurality of individual pins, as recited in independent claims 14 and 18.

8. Claims 32, 33, 36, 39, 40, 42, and 43 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Toniae M. Thomas whose telephone number is (571) 272-1846. The examiner can normally be reached on Monday through Friday from 8:30 a.m. to 5:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (571) 272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TMT
11 June 2005



Mary Wilczewski
Primary Examiner